Standardized Spent Nuclear Fuel Canister

Across the U.S. Department of Energy complex there is a need to increase safety and mitigate potential impacts of handling spent nuclear fuel and hazardous/radioactive wastes due to unforeseen events. The INEEL has developed a unique type of canister to safely handle, store, and transport spent nuclear fuels and hazardous/radioactive wastes.

NUCLEAR MATERIALS Engineering & Disposition

www.inel.gov/env-techengineering

Overview

The U.S. nuclear industry and its associated infrastructure continues to generate spent nuclear fuels, and hazardous/radioactive wastes that must be stored for an interim period of time then shipped to an authorized disposal facility. Without engineered protection during interim storage or transportation to disposal sites, an increased risk exists that these materials could be released to the environment due to an accident or intentional action. Such events could pose threats to people and the surrounding environment and produce severe adverse economic consequences.

INEEL's work for the National Spent Nuclear Fuel Program has become the DOE's model for safely containerizing spent nuclear fuel.

INEEL Solutions

During research and development efforts to safely contain Department of Energy spent nuclear fuel for eventual repository disposal, the INEEL developed the standardized spent nuclear fuel canister for the Department. This canister was designed to minimize fuel handling during interim storage, transport and final disposal operations. (See the illustration on the reverse page.)

To maximize the integrity and safety of a canister during a potential drop or sudden impact, the canister design incorporates an energy-absorbing skirt. This feature deforms on impact to protect the canister heads and shell that enclose the radioactive materials or wastes. This durable, robust canister

Idaho National Engineering and Environmental Laboratory
P.O. Box 1625
Idaho Falls, ID
83415-3135

Management Contact

Phil Wheatley

Manager,
Nuclear Materials Engineering & Disposition Department

Phone- 208-526-9348
E-mail- pdw@inel.gov

Technical Contact

D. Keith Morton

Phone- 208-526-1274
E-mail- dxm@inel.gov

design is sufficient to withstand operational loads and accidental drops without breaching or allowing the contents to escape. The overall integrity of the canister was demonstrated through multiple drop tests at varying impact angles followed by helium leak testing.

The testing results demonstrated that the canisters were "leaktight" with leak rates less than 10^{-7} standard cubic centimeters/second.

Business Products

Although the standardized canister was developed for handling spent nuclear fuel, it can be easily adapted to interface with hazardous/radioactive wastes through the introduction of canister liners or use of different canister materials.

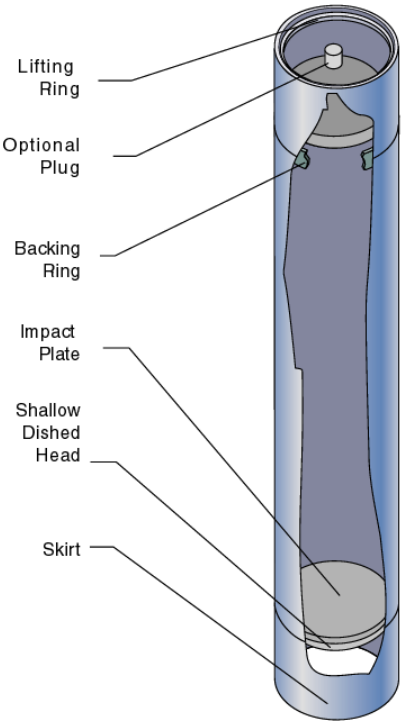
This canister was initially designed to be welded, yet a variety of closures systems including threaded nozzles or bolted lids with seals can be incorporated – depending on the type of material or waste to be inserted.

Benefits

- Proven robust canister design
- No-breach capability demonstrated for severe accidental drops
- Engineering and testing capabilities available to demonstrate product functionality
- Easily adaptable design for customer needs and design specifications.

Customer Service

The Energy and Engineering Technology Directorate at the INEEL has the expertise and technology to provide the engineering and testing necessary to develop and demonstrate the acceptability of size variation, materials, access, closure or handling necessary to fulfill customer-specific requests.



The robust nature of the design and construction of this multipurpose canister has been proven effective for storing and shipping spent nuclear fuel and can be adapted to handle hazardous materials.